AMENDMENTS TO THE CLAIMS

Please amend claims 1-5, 7, 8, 10, 12, 14, and 17-27 as follows.

Please add new claims 28 and 29 as follows.

1). (Currently amended) A method, comprising:

~~performing repeatedly edge profiling on a program using hardware and software, including directly measuring branch execution frequencies over an entire execution period of the program;~~

during execution of a program, repeatedly performing edge profiling, comprising:

detecting profile phase transitions in the program by profiling hardware; ~~repeatedly, wherein a profile phase transition is an indication that one or more cold program edges have become a corresponding number of hot program edges; and~~

updating profile phase transitions by the profiling hardware in response to detected profile phase transitions;

signaling profile phase transitions to a dynamic optimizer by the profiling hardware; and

optimizing the program by the dynamic optimizer based upon the profile phase transitions ~~and edge profile~~.

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2). (Currently amended) The method of claim 1, ~~wherein performing repeatedly edge profiling comprises:~~ further comprising:

inserting edge profiling instructions by a compiler into the program;

arranging profile data by the compiler; and

executing the program.

~~using software to insert edge profiling instructions and arrange profile data;~~

~~executing the program; and~~

~~using hardware to update profile phase transitions, and signal phase transitions.~~

3). (Currently amended) The method of claim 2, wherein ~~using software to insert~~ inserting edge profiling instructions comprises modifying branch instructions to assign an identifier to one or more profiled edges, and to assign a value to an edge selection field.

4). (Currently amended) The method of claim 3, wherein ~~using software to insert~~ inserting edge profiling instructions further comprises inserting a profile identifier instruction when the profiled edge lacks at least one of a branch instruction; an initialize profile instruction; and a set offset instruction.

5). (Currently amended) The method of claim 2, wherein ~~using hardware~~ repeatedly performing edge profiling comprises translating edge profiling instructions into profile update operations by the profiling hardware.

6). (Original) The method of claim 4, further comprising:

loading a profile information register with a base address, an offset value, a

trigger-counter, and a flag.

7). (Currently amended) The method of claim 5, further comprising:

intercepting with the profiling hardware the profiling instructions;

generating a profile update operation; and

updating profile counters.

8). (Currently amended) The method of claim 1, wherein ~~detecting profile phase~~

~~transitions repeatedly,~~ signaling profile phase transitions comprises generating an

interrupt signal by the profiling hardware when the profile phase transition occurs.

9). (Previously presented) The method of claim 8, further comprising:

determining if a program edge is hot, comprising

determining if the profiling instruction is executed, and

updating profiling counters associated with the profiling instruction;

determining if a cold edge becomes a hot edge, comprising

incrementing and decrementing trigger counters, and

detecting if trigger counters overflow and underflow;

preventing a false phase transition by detecting trigger counters underflow.

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10).   (Currently amended) A system, comprising:

a processor pipeline to generate a profile ID for each profiled edge, and generate profile

    update operations;

a profile information register coupled to the processor pipeline;

a first logic device to accept the profile update operations and profile ID to generate a

    memory buffer address;

a profile cache to accept the buffer address connected to the first logic device; and

a second logic device connected to the profile cache configured to generate a phase

    transition interrupt signal,

wherein the system performs edge profiling on a program including directly measuring

    branch execution frequencies over an entire execution period of the program,

    detects profile phase transitions repeatedly, wherein a profile phase transition is

    an indication that one or more cold program edges have become a corresponding

    number of hot program edges, and optimizes the program based upon the profile

    phase transitions.

11).   (Original) The system of claim 10, wherein the processor pipeline

    executes the program;

    intercepts profiling instructions and updates profile counters; and

    updates profile phase transition trigger counters, and signals phase transitions.

12).   (Currently amended) The system of claim 11, wherein ~~the~~ software inserts edge profiling instructions for modifying branch instructions to assign an identifier to one or more profiled edges, and to assign a value to an edge selection field.

13).   (Original) The system of claim 12, wherein the software while inserting edge profiling instructions, also inserts a profile identifier instruction when the profiled edge does not have a branch instruction; an initialize profile instruction; and a set offset instruction.

14).   (Currently amended) The system of claim 11, wherein the <u>system</u> ~~processor~~ translates edge profiling instructions into profile update operations.

15).   (Original) The system of claim 13, wherein the processor pipeline loads a profile information register with a base address, an offset value, a trigger-counter, and a flag.

16).   (Original) The system of claim 14, wherein the processor pipeline:

intercepts the profiling instructions;

generates a profile update operation; and

updates profile counters.

17).   (Currently amended) The system of claim 10, wherein the <u>second</u> logic device generates an interrupt signal when the profile phase transition occurs.

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18).   (Currently amended) The system of claim 17, wherein the ~~system~~ <u>processor</u>:

determines if a program edge is hot, by determining if the profiling instruction is

executed, updating profile counters associated with the profiling instruction, and

determining if the trigger counters overflow;

determines if a cold edge becomes a hot edge, comprising

incrementing and decrementing trigger counters, and

detecting if trigger counters overflow and underflow;

prevents a false phase transition by detecting trigger counters underflow.

19).   (Currently amended) A computer-readable medium having stored thereon a

plurality of instructions, said plurality of instructions when executed by a computer,

cause said computer to perform:

. <u>during execution of a program, repeatedly performing edge profiling, comprising:</u>

~~performing repeatedly edge profiling on a program, including directly measuring branch~~

~~execution frequencies over an entire execution period of the program;~~

detecting profile phase transitions <u>in the program by profiling hardware;</u>

~~repeatedly, wherein a profile phase transition is an indication that one or more~~

~~cold program edges have become a corresponding number of hot program edges;~~

~~and~~

<u>updating profile phase transitions by the profiling hardware in response to</u>

<u>detected profile phase transitions;</u>

signaling profile phase transitions to a dynamic optimizer by the profiling

hardware; and

optimizing the program by the dynamic optimizer based upon the profile

phase transitions and edge profile.

20). (Currently amended) The computer-readable medium of claim 19 having stored

thereon additional instructions, said additional instructions when executed by [[a]] the

computer for using hardware and software to perform edge profiling on a program,

cause said computer to further perform:

inserting edge profiling instructions by a compiler into the program;

arranging profile data by the compiler; and

executing the program.

using software to insert edge profiling instructions and arrange profile data;

executing the program; and

using hardware to update profile phase transitions, and signal phase transitions.

21). (Currently amended) The computer-readable medium of claim 20 having stored

thereon additional instructions, said additional instructions when executed by [[a]] the

computer for using software to insert edge profiling instructions, cause said computer

to further perform:

modifying branch instructions to assign an identifier to one or more profiled

edges, and to assign a value to an edge selection field.

22).   (Currently amended) The computer-readable medium of claim 21 having stored

thereon additional instructions, said additional instructions when executed by [[a]] the

computer ~~for using software~~ to insert edge profiling instructions, cause said computer

to further perform:

        inserting a profile identifier instruction; when the profiled edge does not

            have a branch instruction, an initialize profile instruction, and a set

            offset instruction.

23).   (Currently amended) The computer-readable medium of claim 20, ~~having stored~~

~~thereon additional instructions, said additional instructions when executed by a~~

~~computer for using hardware, cause said computer to further perform~~ wherein

repeatedly performing edge profiling comprises translating edge profiling instructions

into profile update operations by the profiling hardware.

24).   (Currently amended) The computer-readable medium of claim 22 having stored

thereon additional instructions, said additional instructions when executed by [[a]] the

computer, cause said computer to further perform:

        loading a profile information register with a base address, an offset value, a

trigger-counter, and a flag.

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25).   (Currently amended) The computer-readable medium of claim 23 having stored

thereon additional instructions, said additional instructions when executed by [[a]] the

computer, cause said computer to further perform:

    intercepting with the profiling hardware the profiling instructions;

    generating a profile update operation; and

    updating profile counters.

26).   (Currently amended) The computer-readable medium of claim 19 having-stored

thereon additional instructions, said additional instructions when executed by a

computer for detecting profile phase transitions repeatedly, cause said computer to

further perform:

    generating wherein signaling profile phase transitions comprises generating an

interrupt signal by the profiling hardware when the profile phase transition occurs.

27).   (Currently amended) The computer-readable medium of claim 26 having stored

thereon additional instructions, said additional instructions when executed by [[a]] the

computer for detecting profile phase transitions repeatedly, cause said computer to further

perform:

    determining if a program edge is hot, comprising

        determining if the profiling instruction is executed, and

        updating profile counters associated with the profiling instruction;

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determining if a cold edge becomes a hot edge, comprising

incrementing or decrementing trigger counters, and

detecting if trigger counters overflow and underflow;

preventing a false phase transition by detecting trigger counters underflow.

28). (New)   The method of claim 1 wherein signaling profile phase transitions to the

dynamic optimizer by the profiling hardware comprises:

not signaling a profile phase transition if a false transition signal is detected by the

profiling hardware.

29). (New)   The computer-readable medium of claim 19 wherein signaling profile phase

transitions to the dynamic optimizer by the profiling hardware comprises:

not signaling a profile phase transition if a false transition signal is detected by the

profiling hardware.